



Depression and anxiety among traumatic brain injury patients in Malaysia

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ARTICLE INFO

Keywords:

Depressive disorders
Anxiety disorders
Comorbid depression and anxiety
Traumatic brain injury
Malaysia

ABSTRACT

Background: Depression and anxiety are common psychiatric sequelae of traumatic brain injury (TBI). However, there is lack of data on comorbid depression and anxiety, and depression and anxiety in TBI patients were often evaluated using non-validated diagnostic tools. This study aims to determine the rates, their comorbidity, and factors associated with depressive and anxiety disorders in TBI patients.

Methods: In this cross-sectional study, 101 TBI patients were interviewed using the Structured Clinical Interview for DSM-IV Axis I Disorders to assess the rates of depressive and anxiety disorders after TBI. The association of socio-demographic and clinical factors with depressive and anxiety disorders were determined using Pearson's Chi-Square test.

Results: A total of 25% of TBI patients (n = 25/101) were diagnosed with depressive disorders, of which 15% had major depressive disorder (n = 15/101) and 10% had minor depression (n = 10/101). Fourteen percent of TBI patients had anxiety disorders (n = 14/101), of which post-traumatic stress disorder (PTSD) was the commonest anxiety disorder (9%, n = 9/101). Seven percent of TBI patients (n = 7/101) had comorbid depressive and anxiety disorders. The only factor associated with depressive disorder was the duration of TBI (≥ 1 year) while the only factor associated with anxiety disorder was the mechanism of trauma (assault).

Conclusion: Major depressive disorder, minor depression and PTSD are common psychiatric complications of TBI. Clinicians should screen for depressive and anxiety disorders in TBI patients, particularly those with ≥ 1 year of injury and had sustained TBI from assault.

1. Introduction

Traumatic brain injury (TBI) can result in a number of neuropsychiatric sequelae; including major depression, anxiety, psychosis, and aggression (Koponen et al., 2002; Mauri et al., 2014). The commonest psychiatric complication associated with TBI is depression, with prevalence rates ranging between 6% to 77%, while 2% to 50% of people with TBI suffer from anxiety disorders (Seel et al., 2003; Osborn et al., 2014, 2016). The wide range in rates could have been attributed to differences in methodology employed by previous studies, such as the use of different measurement tools for depression and anxiety in TBI patients, and small sample sizes. Most of the previous studies relied on semi-structured interviews and use of checklists without diagnostic validity (Seel et al., 2003; Bombardier et al., 2010). There is also a lack of data on the prevalence of comorbid depression and anxiety disorders in TBI patients which is worth exploring.

Factors demonstrated to be associated with depressive disorders in TBI patients include age, lower education level, young adult, premorbid

substance misuse, premorbid psychiatric problems, comorbid anxiety, intellectual impairment and left dorsolateral and ventromedial prefrontal cortical lesions (Hart et al., 2011; Roy et al., 2018). However, there were no statistically significant associations reported. With regards to anxiety disorders, data on such factors are scarce.

Negative outcomes associated with depressive and anxiety disorders in TBI patients underline the need for this study. Depression in TBI patients has been linked to decreased community integration, overall functioning, decline in quality of life, aggression, poor recovery and higher rates of suicidal attempts (Bombardier et al., 2010; Hart et al., 2011). Similarly, anxiety disorders in TBI patients are associated with poor interpersonal functioning, decline in independent living and acts as a positive predictive factor for the development of depression in TBI patients (Hart et al., 2011; Zaninotto et al., 2016).

Clearly, there is a research gap in determining the relationship between depression and anxiety using a validated gold standard diagnostic tool among patients with TBI. This study aims to investigate the rates of depression and anxiety disorders as well as comorbid

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depression and anxiety in Malaysian TBI patients, and determine the socio-demographic and clinical factors associated with depression and anxiety in Malaysian TBI patients.

2. Methods

2.1. Participant recruitment

This one-year cross-sectional study was conducted in the Neurosurgery Clinic of Hospital Pulau Pinang, a northern tertiary referral centre for Neurosurgery in Malaysia. Ethical approval was obtained from the Human Ethics Committees of Universiti Kebangsaan Malaysia and the Ministry of Health, Malaysia. Patients diagnosed with TBI, who attended the Neurosurgery Clinic of Hospital Pulau Pinang, fulfilled the study criteria and consented to the study were recruited via consecutive sampling. Participants were recruited if they were aged 18 years or above, sustained TBI at least 3 months prior to recruitment, able to read and write in Malay, and possessed a Karnofsky Performance Scale score of at least 70 (Greenberg, 2010). The researchers initially intended to only include patients who had TBI of at least 6 months to allow for a period of adjustment post-trauma, however this was later revised to 3 months as most of the patients were discharged to the district hospitals after 3 months. A Karnofsky score of at least 70 was chosen to exclude patients with poorer functional status and greater physical disability that may affect the patient's emotional status and ability to complete the assessment. Participants were excluded if they had a prior history of TBI or neurological disorders, pre-existing psychiatric illnesses, or had active psychiatric symptoms which impeded their ability to cooperate with the study.

2.2. Data collection and measures

Socio-demographic (age, gender, marital status, religion, education level, and employment status) and clinical data (duration of TBI, Glasgow Coma Scale (GCS) score/severity of head injury, mechanism of trauma, and type of head injury) were collected. Following this, a researcher trained in the use of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)- Research Version, administered the SCID-I to assess for depressive and anxiety disorders among the participants.

2.2.1. Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)-Research Version

SCID-I is a semi-structured interview questionnaire based on the Diagnostic and Statistical Manual for Psychiatric Disorder (DSM) IV diagnostic criteria. Administered by trained personnel, the SCID-I has good reliability and validity with kappa values ranging from 0.7 to 1.0 (First et al., 2002). A diagnosis of a psychiatric disorder is made if the patient fulfils the diagnostic algorithm criteria found in SCID-I.

2.3. Data analysis

Data was analysed with SPSS version 22. Descriptive statistics of the socio-demographic and clinical factors and the rates of depressive and anxiety disorders among the participants were determined. The association of socio-demographic and clinical factors with depressive and anxiety disorders were evaluated using Pearson's Chi Square (χ^2) and Fisher's exact test. Statistical significance was set at the value of $p < 0.05$.

3. Results

3.1. Socio-demographic and clinical characteristics of participants

A total of 101 TBI patients were recruited and completed this study. The mean age of participants was 37 years old (± 17 years). Eighty four percent of the participants were males while 54% of the

Table 1
Socio-demographic and clinical characteristics of TBI participants.

	Number of participants (n)	Percentage (%)
Mean age	37 years	(SD = 17)
Gender:		
Male	85	84
Female	16	16
Marital status:		
Married	46	46
Single/divorce	55	54
Education level:		
Primary education	18	18
Secondary education and higher	83	82
Religion:		
Islam	50	49
Buddhist	30	30
Hindu	17	17
Christians	4	4
Employment status:		
Employed	43	43
Unemployed	58	57
Mean duration of TBI	16 months	(SD = 19)
GCS score/severity of head injury:		
Mild (GCS 14-15, with LOC)	32	32
Moderate (GCS 9-13)	21	21
Severe (GCS 3-8)	38	38
Mechanism of trauma:		
Motor vehicle accident (MVA)	91	90
Other mechanisms	10	10
Type of head injury:		
Subdural haemorrhage	26	26
Extradural haemorrhage	16	16
Contusion	11	11
Intracerebral haemorrhage	25	25
Mixed types of injury	21	21

participants were single or divorced. Eighty two percent of the TBI patients had up to at least secondary education while slightly more than half of them were unemployed (57%). Muslims formed the majority of the participants (49%). The mean duration of TBI of the participants was 16 months (± 19 months). The majority sustained severe head injuries (38%), while nearly a third (32%) had injuries of mild severity, followed by 21% with moderate severity. Ninety percent of the TBIs were due to motor vehicle accidents (MVA), with 26% having subdural haemorrhage, 25% with intracerebral haemorrhage and 21% with mixed type injuries. Socio-demographic and clinical characteristics of the TBI patients are summarized in Table 1.

3.2. Rates of depression and anxiety among the participants

Twenty-five percent of the participants were diagnosed with depressive disorders. From this total percentage, 15% had major depressive disorder, and 10% had minor depression respectively. Fourteen percent of the respondents were diagnosed with anxiety disorders. In those with depressive disorders, 7% of the participants co-morbid anxiety disorders. Among those with anxiety disorders, 6% had comorbid major depressive disorder and 1% had minor depressive disorder. The findings are summarized in Table 2.

3.3. The association between socio-demographic and clinical characteristics with depression and anxiety in TBI patients

The only factor which we found to be significantly associated with diagnosis of depressive disorders was the duration of TBI. In this study, patients with TBI exceeding 1 year (45.4%, $n = 15/33$) had significantly larger proportion of depressed patients than those less than one year (14.7%, $n = 10/68$) ($\chi^2 = 11.28$, $p = 0.001$). The findings are summarized in Table 3.

As for anxiety disorders, the only factor which was significantly

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